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AIDS-RELATED ISSUES

**THE IMPACT OF AIDS
ON THE
KAISER PERMANENTE
MEDICAL CARE PROGRAM
(Northern California Region)**

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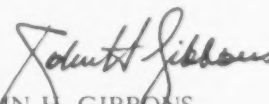
PREFACE

The impact of AIDS on the Nation's health and health care resources continues unabated. Congress has responded to the AIDS crisis with large increases in Federal funds for basic and applied research and education, and has begun to grapple with the difficult issues involved in financing AIDS-related health care. AIDS is also appearing on the agenda of an increasing number of congressional committees and raises numerous important issues that will require further congressional attention and decisions. These developments led to a recommendation by OTA's Technology Assessment Board, with encouragement from the Legislative Subcommittee of the House Appropriations Committee, that OTA provide assistance on AIDS-related issues to the Congress on a sustained basis.

The topic of this fourth paper in OTA's series of AIDS-related issues is the impact of the AIDS epidemic on the Kaiser Permanente Medical Care Program's (KPMCP) northern California region and was originally commissioned for OTA's assessment of *Medical Testing and Health Insurance*. Key OTA staff involved in the oversight of the project were Jill Eden, Larry Miike, and Laurie Mount.

The KPMCP is a private, nonprofit, health care program that provides prepaid medical and hospital services to more than 5 million people in 16 States and the District of Columbia. Its northern California region serves 25 percent of the area's population and is second only to the county health system as a provider of care to AIDS patients in San Francisco. This paper reviews KPMCP's northern California region's AIDS cases between 1981 and June 1987 and presents a cost analysis of a sample of these patients.

The preceding Staff Papers in this series were: *Do Insects Transmit AIDS?* (September 1987), *AIDS and Health Insurance - An OTA Survey* (February 1988), and *How Effective is AIDS Education?* (June 1988). (See inside back cover for information on how to order these publications.) Previous OTA reports addressing AIDS-related issues include: 1) *Blood Policy and Technology* (January 1985), 2) *Review of the Public Health Service's Response to AIDS* (Technical Memorandum, February 1985), and 3) *The Costs of AIDS and Other HIV Infections: Review of the Estimates* (Staff Paper, May 1987).


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**THE IMPACT OF AIDS ON THE KAISER PERMANENTE
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(Northern California Region)**

by

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(Northern California Region)**

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The views expressed in this Paper do not
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1. SUMMARY

The Kaiser Permanente Northern California Region (KPNCR) serves a total membership of more than 2 million people, 25 percent of the area's population, and is second only to the county health system as a provider of care to AIDS patients in San Francisco.

From 1981 through June 1987, a total of 940 KPNCR patients were diagnosed with AIDS. *Pneumocystis carinii* pneumonia (PCP) was the presenting diagnosis in 63 percent of the AIDS patients, while 15 percent were initially diagnosed with Kaposi's sarcoma (KS). These 940 patients represent 23.7 percent of all cases reported to the State of California during the same period for the same geographic areas. The incidence of AIDS within KPNCR increased from roughly 1.6 cases per 100,000 members before 1984 to 19.7 cases per 100,000 by June 1987. This represents a 59 percent average annual increase in the number of new cases between 1984 and 1986, the period of time for which complete annual data were available. This rate of increase is expected to decrease, but not significantly, within the next 5 years.

Information on the cost of AIDS care was available for 913 of the 940 patients. Twenty-seven of the 940 cases were excluded because the date of diagnosis was not available. The 913 AIDS patients (39 percent were still alive in June 1987) were hospitalized a total of 1,994 times and stayed 23,697 days in total.

Lifetable methods were used to obtain unbiased estimates of total lifetime hospitalizations and hospital days for all 913 cases. This approach yielded a lifetime mean of 3.5 hospitalizations (± 0.15) and a lifetime mean of 39.3 (± 1.27) hospital days per case. Corresponding medians were 3.0 and 32, respec-

tively. Patients whose initial diagnosis was PCP were hospitalized for longer periods than were KS patients; the mean length of hospitalization was 12.0 versus 10.6 days.

A sample of 30 AIDS patients was selected randomly from the 596 AIDS patients who had received care in the Kaiser Permanente San Francisco or Oakland hospitals. Each patient's total utilization of Kaiser services was reviewed, beginning one year prior to AIDS diagnosis, to derive costs for inpatient care, outpatient care, tests and procedures, and pharmacy prescriptions.

The estimated mean cost from date of diagnosis to death was \$35,054 in actual dollars (standard error $\pm$ \$4,245). The median cost was somewhat lower at \$29,929, suggesting that the distribution of costs was skewed toward the higher amounts (i.e., that a few patients with very high costs increased the mean).

Annual costs per patient were calculated for three time periods--1984-85, 1986, and the first half of 1987--to look for trends in the costs of AIDS care. Total costs and hospital costs changed little from the first to the second period, but fell 20 percent and 36 percent, respectively, in 1987. The drop in hospital costs may be attributable to the establishment, in March 1986 of an outpatient unit (known as the Infusion Center) to provide intravenous (IV) medication to AIDS patients at Kaiser Permanente's San Francisco hospital. In its first 18 months of operation this center saved an estimated 3,500 inpatient days.

In contrast, annual outpatient pharmacy costs climbed markedly from \$386 per person during 1984-85 to \$2,423 in 1986 and \$4,477 in 1987. This reflects the introduction of the

drug AZT as an outpatient treatment for AIDS during 1986.

Total costs per AIDS patient for one year of care averaged \$25,119 from 1984 through June, 1987. The product of the annual costs per case (\$25,119) and the number alive at mid 1987 (346) gives an estimate of the total cost of care for all AIDS patients in 1987 (\$8,691,174). If the incidence of AIDS and survival time increased during this time, the use of the number of cases alive at the midpoint of the year underestimates the average number alive during the year. This could also lead to an underestimate of total costs.

Limitations in KPNCRC's cost accounting and data systems make it difficult to precisely measure the overall impact of AIDS-related care on the 1988 basic rate. The ratesetting forecast for 1988 includes 14,120 patient days related to AIDS or AIDS-related complex (ARC). This represents 2.0 percent of the total adult and pediatric patient day forecast,

or more than \$8.6 million--a significant increase from the estimated 1987 inpatient cost of \$5.7 million.

Given the relationship of AIDS inpatient costs to other services (e.g., outpatient visits and ancillary services), the impact of AIDS/ARC on the basic rate is in excess of \$0.55 per member per month, exclusive of the cost of AZT.

A total of 2,501 new AIDS cases are forecast for July 1987 through 1990. Assuming mean lifetime costs of \$35,054, the costs for providing care to these patients will be \$87.7 million. This estimate does not consider inflation, additional costs incurred as life-extending therapies are developed, costs of care for infected patients who do not yet fulfill the diagnostic criteria for AIDS (i.e., patients with ARC or human immunodeficiency virus seropositivity), or changes in the cost of care resulting from new alternative health care arrangements.

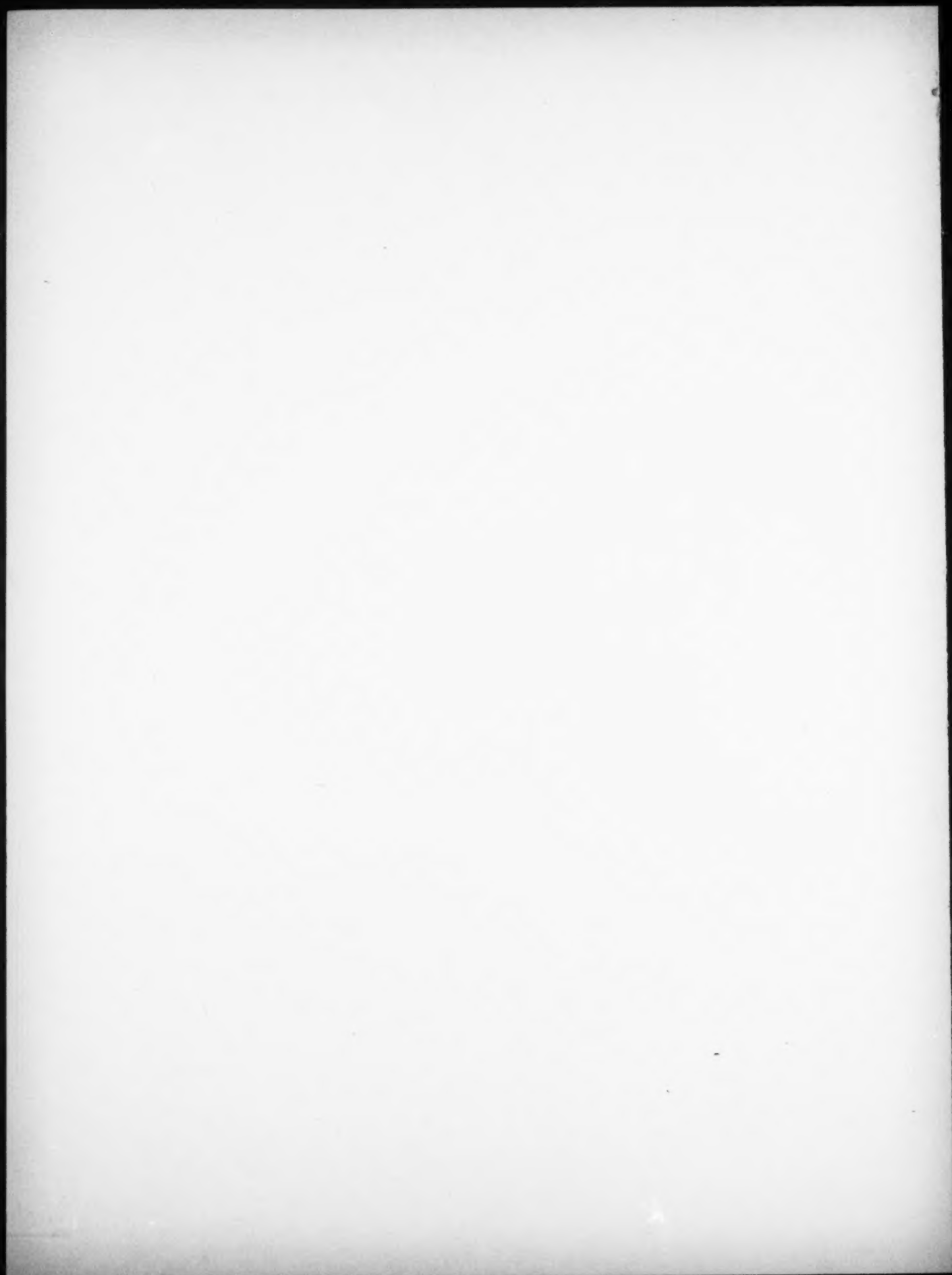
2. INTRODUCTION¹

The Kaiser Permanente Medical Care Program (KPMCP) is the largest private health care program in the United States, and the majority of its membership resides in areas with large numbers of AIDS cases. The Northern California Region of the program is second only to the county health system as a provider of care to AIDS patients in San Francisco.

In the summer of 1987, the Office of Technology Assessment contracted with the Kaiser Permanente Northern California Region (KPNCR) to report the impact of the AIDS epidemic on its program with a special focus on cost issues.

From 1981 through June 1987, a total of 940 KPNCR patients were diagnosed with AIDS. This paper looks at how these cases were identified, who they were, the services they used, and the cost of their care. In addition, background information is provided on KPNCR's organization, membership, benefits structure, and ratesetting methods.

¹ This report was prepared by the Northern California Region of the Kaiser Permanente Medical Care Program and does not necessarily reflect the views, data or policies of any other region within the Kaiser Permanente Medical Care Program.



3. METHODS

CONSTRUCTION OF THE AIDS DATABASE

The KPNCr AIDS database was constructed from three computerized sources (described below) and contained a total of 940 patients diagnosed with AIDS between January 1981 and June 30, 1987.²

1) The Inpatient Utilization System (IUS) file contains data for all hospitalizations at any KPNCr hospital and includes up to 13 ICD-9-CM diagnostic codes per admission. These data have been used in many epidemiologic studies and their accuracy verified for a variety of diagnoses.

The file was searched from 1981 onward for definite and probable cases of AIDS, applying an AIDS case definition based on that of the Centers for Disease Control (CDC) criteria (10,11).

2) The pathology file contains biopsy reports from five major KPNCr hospital pathology departments, including San Francisco's and Oakland's. Probable cases of AIDS were identified from biopsy diagnoses of Kaposi's sarcoma (KS), *Pneumocystis carinii* pneumonia (PCP), candidiasis, and certain non-Hodgkin's lymphomas.

3) The KPNCr hospital pharmacy file contains information on all patients on AZT treatment protocols.

Medical records of most cases identified only by the pathology file or the AZT list were reviewed to verify the diagnosis of AIDS and to identify the date of diagnosis. Medical records of many women who lacked a specific diagnosis of AIDS were also reviewed. At chart review, cases not fitting

CDC criteria for AIDS were removed from the database.

In September 1987, the CDC expanded its criteria for the diagnosis of AIDS to include AIDS-dementia and generalized wasting. Due to time constraints, these criteria could not be applied in identifying cases in the database. Therefore, the numbers presented in this report may underestimate the total number of AIDS cases by about 5 percent (13). On the other hand, the AIDS database used in this report represents a combination of cases identified solely by computer criteria and cases confirmed either by chart review, the Confidential Case Report filed with the State, or a report from an Infection Control nurse. A few cases currently in the file therefore may not represent AIDS.

Table 3-1 shows the frequency of the best currently available source of diagnosis for the 940 cases in the AIDS database in decreasing order of certainty of the diagnosis.

On the basis of their initial AIDS-related diagnosis, an attempt was made to classify all cases as either AIDS with infection (042.0),

Table 3-1.--AIDS Cases by Best Source of Confirmation

Source	Number	Percent
Chart review.....	87	9.3%
Copy of confidential case report...	110	11.7
Infection control nurse's report...	93	9.9
IUS (hospitalization) file and AZT file.....	88	9.4
IUS file and pathology file.....	96	10.2
IUS file only.....	426	45.3
Pathology file only.....	35	3.7
AZT file only.....	5	0.5
Total.....	940	100%

2 The prevalence of HIV seropositivity and of AIDS-related complex (ARC) among the KPNCr membership are unknown.

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

AIDS with neoplasm (042.2), or AIDS with other diagnosis (042.9). In the absence of a diagnosis of AIDS on the hospital discharge form, a presumptive diagnosis of AIDS was made in males less than 60 years of age if an AIDS-related diagnosis was noted without an alternative diagnosis to explain immune deficiency. (The medical records of all men less than 60 years of age who have a diagnosis suggestive of AIDS but not a diagnosis of AIDS itself, are to be reviewed further. Women and men over 60 years of age with 2 possible AIDS-related diagnoses were not included, but their charts are also to be reviewed to identify possible additional cases.) The decision rules, based to the extent possible on the CDC case definition, that were used to guide classification are summarized in table 3-2.

For each AIDS case, whether chart review was performed or not, the date of diagnosis was defined as the earliest date associated with a diagnosis of AIDS or a diagnosis compatible with AIDS. This date was used in the descriptive analysis of all cases and as the starting point for the calculation of AIDS-related costs in the sample.

DATA COLLECTION METHODS FOR MEASURING RESOURCE UTILIZATION

AIDS patients had voluminous medical records and although a larger sample would be desirable, time did not allow for complete data collection for more than a sample of 30 patients. For each of the 30 cases in the sample, complete inpatient, outpatient, hospice, and home health care records, beginning 1 year prior to the date of diagnosis, were reviewed by trained medical records analysts. Each service or resource was entered as a separate item and assigned a cost.

As noted, sample size was limited primarily by the time available to review medical records with the appropriate scrutiny. The sample was also restricted to patients

diagnosed since January 1, 1984, in order to reflect more recent utilization patterns while also allowing enough time for the disease to run its course.

Table 3-3 provides details on the data that were collected to help measure the resource utilization of the 30 sample AIDS patients.

UNIT COST CALCULATION

Average unit costs were assigned to all the identified services provided to AIDS patients. These unit costs are "fully loaded" to include the expenses attributable directly to the delivery of a service, the "overhead" connected with the operation of the medical facility, and the indirect "overhead" connected with health plan operations. No effort was made to separate the AIDS-related costs of care from the costs of other services provided to AIDS patients. Assuming average utilization of non-AIDS-related services among the 30 sample cases, the effect on the cost estimates would be negligible. (See appendix A, table A-5, for average utilization statistics for all KPNC members.)

Average unit cost calculation was based on the standard methodology used for KPNC's Medicare cost reports. Cost data were drawn primarily from 1986 sources.

Hospital Bed Unit, Per Diem

The nursing costs of AIDS patients who are hospitalized in units with non-AIDS patients cannot be readily determined. However, in an AIDS-dedicated nursing unit, such as in the San Francisco facility, nursing costs are about 40 percent greater than the costs for other medical/surgical patients. This additional cost was included in the per diem hospital bed cost. Overhead was allocated to direct costs (such as nursing and supplies), based on the standard stepdown methodology used for Medicare cost report-

Table 3-2.--AIDS Classification Guidelines

Case identified by	Classification
1. Copy of Confidential Case Report sent to the State	Included as a case; no chart review; initial diagnosis obtained from the case report
2. Infection control nursing records (without copy of confidential case report or information on initial diagnosis)	Included as case; no chart review; classified as 042.9 (AIDS, initial diagnosis unspecified)
3. Diagnosis on the IUS file:	
a. ICD-9-CM diagnosis of AIDS (279.10 - 279.19 before Sept. 1986, 042.0 - 042.9 thereafter):	
o With additional diagnosis of AIDS-related opportunistic infection	Classified as 042.0, no chart review
o With additional diagnosis of AIDS-related neoplasm	Classified as 042.2, no chart review
o With additional diagnosis of wasting or dementia	Classified as 042.9, no chart review
o With no additional AIDS-related diagnoses	Classified as 042.9, no chart review
b. No ICD-9-CM diagnosis of AIDS, but male, <60 years old, and no other diagnosis to explain immune deficiency:	
o With AIDS-related opportunistic infection, including:	Classified as 042.0, chart review pending
--Pneumocystis carinii pneumonia,	
--toxoplasmosis of central nervous system	
--cryptococcal meningitis	
--coccidiosis	
--CMV pneumonia, excluding neonatal	
--progressive multifocal leuko-	
--encephalopathy	
--candidiasis of esophagus	
o With AIDS-related neoplasm:	Classified as 042.2, chart review pending
--Kaposi's sarcoma (ICD-9-CM 173.8)	
c. No ICD-9-CM diagnosis of AIDS, female or male >60 years	Excluded from database, chart review pending
4. AZT file or Pathology File only	Chart review done to verify diagnosis. If chart review revealed that AIDS was not diagnosed, the case was removed from the database

SOURCE: Kaiser Permanente (Northern California Region), unpublished material, Oakland, CA, 1988.

Table 3-3.--Data on Resource Utilization of AIDS Patients

Resource	Data collected
1. Inpatient services	a. Date and hour of entry, discharge, and transfer of service. b. Inpatient service (e.g., intensive care, medical/surgical, hospice). c. Specialty consultation.
2. Inpatient pharmacy services	a. Utilization was estimated based on prescriptions ordered for all hospitalized AIDS patients during an 8-day period of observation in the San Francisco and Oakland facilities in October 1987.
3. Outpatient services (excluding psychiatric utilization)	a. Date of visit (or service). b. Facility type. c. Clinic type. d. Provider type. e. Procedures: diagnostic or therapeutic (e.g., lumbar puncture, laboratory, radiology). f. Support services (e.g., social services). g. Prescriptions: quantity, strength, refills.
4. Psychiatric services	For reasons of patient confidentiality, use of psychiatry services was assessed by the staff of the psychiatry departments in Oakland and San Francisco. A list of all patients in the sample was submitted to each department. Department staff examined charts to record the following: a. Date of visit. b. Visit type. c. Provider type. d. Prescriptions.
5. Outpatient pharmacy services	It was assumed that all prescriptions and refills indicated in the record were actually dispensed and that refills were not prescribed unless indicated. This approach is inaccurate to the extent that clinicians fail to record refills authorized or patients fail to fill all prescriptions or refills indicated. In some instances, notation of prescriptions was incomplete. For example, the quantity prescribed was often omitted. In such cases, a standard quantity was assumed (e.g., a 10-day supply of antibiotic, one-month supply of other medications).

SOURCE: Kaiser Permanente (Northern California Region), unpublished material, Oakland, CA, 1988.

ing.³ Pharmacy costs, generally a part of the allocation process, are specifically excluded and treated as a separate cost area.

Physician Visits: Clinic and Hospital

The cost of a physician's office visit was derived from The Permanente Medical Group's 1986 Unit Cost Worksheet. Overhead costs, including plant operation and local administration, were included. The emergency room is considered an outpatient clinic and assigned a visit cost along with other outpatient clinics. Inpatient physician services (such as bed rounds) were treated separately from physician clinic activity. There was no overlap between the overhead costs allocated to physician clinic v. physician hospital services.

Average visit costs were calculated by dividing total clinic costs (including non-physician provider costs) by total physician visits. No distinction was made between the cost of AIDS visits and other visits. It was not possible to determine whether, on average, visits by AIDS patients consume more (or less) resources than visits by others.

Medications: Inpatient and Outpatient

The Pharmacy Chiefs at the San Francisco and Oakland hospitals agreed that, based on their informal observations, the drugs used to treat AIDS inpatients are more expensive, on average, than those used to treat non-

AIDS inpatients who are hospitalized within the same bed unit. Since the individual inpatient pharmacy costs incurred by the sample of 30 patients were not available, a mean per diem drug cost from pharmacy medication logs for all AIDS patients hospitalized in San Francisco and Oakland in a week in October 1987 was used.

The Pharmacy Chiefs also noted that there is not a significant difference between the cost of dispensing drugs to AIDS inpatients v. other patients in the same unit. Consequently, average hospital dispensing costs (inclusive of overhead) were added to the cost of the AIDS medications.

Outpatient prescriptions were individually tallied and costed out using the current cost of the drug in the pharmacy's inventory asset file. The costs were then adjusted to reflect direct and indirect dispensing expenses.

Ancillary Services: Weighted Procedures

Average unit costs were derived for the ancillary services typically used by AIDS patients. For many services, including EEG, EKG, hospital laboratory, pathology laboratory, physical therapy, radiology, and respiratory therapy, a weighted value methodology was used to estimate unit costs. All applicable direct and indirect overhead were taken into account.

It is widely acknowledged that weighted value costing of ancillary services has weaknesses. The major criticism is that the cost weights employed are only approximations of the actual relative amount of resources required to provide the various tests and therapies. In addition, important cost differences within a cost center (e.g., hematology v. chemistry laboratory tests) may be masked. This could be significant if the mix of tests provided to AIDS patients significantly differs from that given others.

3 The stepdown method allocates the following overhead costs to inpatient beds: 1) buildings and fixtures, 2) moveable equipment, 3) employee benefits, 4) administrative and general, 5) maintenance and repairs, 6) operation of plant, 7) linen and laundry, 8) housekeeping, 9) dietary, 10) cafeteria, 11) nursing administration, 12) central supply, 13) medical records, 14) social service, 15) health plan administration, and 16) residents' salaries and benefits.

Surgery

The cost of surgery was divided into two components: 1) professional fees attributable to the surgeon and anesthesiologist and 2) hospital operating room costs (including the recovery room and nurse anesthetists). The total average hourly cost of the professional component was drawn from the Medicare Part B Revenue Worksheet. The total average hourly cost of the operating room was derived using standard stepdown methodology. Overhead was allocated to both cost components.

Other Services

Other services covered by the health plan and used by AIDS patients were assigned unit costs. The average cost of a home health visit was derived by dividing the total fully allocated cost of the department of home health by the total number of visits. The costs of blood and blood products purchased from county blood banks were defined as the rates charged by those agencies. Ambulance services and outside claims and referrals for specialized services unavailable within the health plan were treated similarly.

SURVIVAL METHODOLOGY

"Survival" methods, also known as "lifetable" methods, were used to examine the distribution of such lifetime amounts and costs of medical service utilization. Survival methods were specifically developed to estimate the amount of time that individuals survive from a starting point to an endpoint, given data on some individuals who are observed until the endpoint and some who are not. Typically, the starting point is the time of disease diagnosis and the endpoint is the time of death. In this analysis, interest centers on the cost from diagnosis to death, rather than on the survival time from diagnosis to

death.⁴ The cost for care from time of diagnosis to the end of observation is a non-negative lower bound for the lifetime cost, which cannot be known until death.

The primary advantage of survival methods for the examination of lifetime cost is that they can make use of information about patients who are still alive. The authors are unaware of any other studies that have used survival methods to estimate the cost of care for AIDS or other illnesses. Survival methods provide unbiased estimates of the lifetime costs that eventually would be attained by living AIDS cases if their future chances of death at various cost levels continue to fit the best model of the recent past. This approach is especially appropriate for the examination of lifetime health care costs in a rapidly growing epidemic if the cases who have died tend to have been short-lived and less costly, or if the patients who are still alive tend to be in early and less costly stages of the disease. The estimators of mean and median lifetime amounts and costs of medical services utilized were obtained by a basic method of survival analysis known as the product-limit method (8). (A formal presentation of the product-limit method is presented in appendix B.)

Subgroup specific estimates of lifetime costs are assessed with the logrank test (12).

In addition to estimates of lifetime cost, estimates of mean costs per patient per year were calculated. These estimates are simple cost rates derived by: 1) summing the total costs of all patients for a given year, 2) summing the amounts of time that the patients were observed for that year, and 3) dividing the former sum by the latter sum. Thus, every patient contributes to the estimate for a given year if he is observed at all during the year, and his contribution to the overall estimate is weighted by the proportion of the year for which he is served.

⁴ For convenience, we use the term "cost" to present the method for analysing both cost and amount of services utilised.

ANALYSIS OF THE AIDS CASELOAD

The 940 AIDS patients represent 23.7 percent of all cases reported to the State of California during the same period for the same geographic areas. The incidence of AIDS within the Kaiser Permanente Northern California Region (KPNCr) increased from roughly 1.6 cases per 100,000 members before 1984 to 19.7 cases per 100,000 by June 1987 (table 4-1). This represents a 59-percent average annual increase in the number of new cases between 1984 and 1986, the period of time for which complete annual data were available. This rate of increase is expected to decrease within the next 5 years. (A further discussion of future AIDS cases is presented later in this section).

By Facility

Nearly half of all AIDS patients (426/940) were diagnosed at the San Francisco facility; Oakland ranks second in AIDS caseload (table 4-2).

By Age and Sex

KPNCr AIDS patients are somewhat older than other AIDS patients from the same geographic area (table 4-3). Mean age at diagnosis for KPNCr cases was 40.0 years as compared to 38.1 years for cases reported to the State. Within KPNCr, 98.6 percent of AIDS patients were male, a proportion almost identical to that for AIDS patients in the local general population.

By Diagnosis

Pneumocystis carinii pneumonia (PCP) was the presenting diagnosis in 63 percent of the AIDS patients (588/940), while 15 percent of the AIDS patients (143/940) were initially diagnosed with Kaposi's sarcoma (KS) (table 4-4). Other reports suggest that a higher percentage of AIDS patients in both the San Francisco area (13) and elsewhere (14) present initially with KS. This difference may be related to how the Kaiser AIDS patients were initially identified; many of the cases were found in the hospital discharge files. Because

Table 4-1.--Incidence of AIDS
1981-June 1987

	1981- 1983	1984	1985	1986	Jan.-June 1987	Total
Number of cases diagnosed.....	85	118	210	300	200	913 ^a
Incidence (per 100,000 members).....	1.6	6.2	10.7	15.0	19.7	

^aTwenty-seven of 940 cases were excluded due to unavailable date of diagnosis.

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

KS, by itself, is seldom a reason for hospitalization, some AIDS patients may have been identified by their first inpatient diagnosis despite an earlier outpatient diagnosis of KS.

Hospital Utilization

The cost of AIDS care is largely a function of total inpatient days. The 913 AIDS patients⁵ (39 percent were still alive in June 1987) were hospitalized a total of 1,994 times and stayed 23,697 days in total. Mean length of stay per hospitalization was 11.9 days overall. The average number of hospitalizations was 2.2, and the average number of hospital days per patient was 26.0. For AIDS patients who were still alive, total lifetime hospitalizations will ultimately be higher. Among AIDS patients who had died, there were 2.6 hospitalizations and 33.4 hospital days per patient. However, AIDS patients who had already died are not representative

5 Twenty-seven of the 940 cases were excluded because the date of diagnosis was not available.

Table 4-2.--Number of AIDS Patients by Facility of Diagnosis
1981-June 1987

Facility	Number	Percent
		of Total ^a
San Francisco.....	426	45.3%
Oakland.....	170	18.1
Santa Clara.....	81	8.6
San Jose.....	39	4.1
Sacramento.....	37	3.9
Vallejo.....	33	3.5
Hayward.....	31	3.3
San Rafael.....	29	3.1
Redwood City.....	26	2.8
Walnut Creek.....	25	2.7
So. San Francisco..	23	2.4
So. Sacramento.....	11	1.2
Martinez.....	5	0.5
Richmond.....	4	0.4
Total.....	940	100.0%

^aPercentages may not total 100 due to rounding.

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

Table 4-3.--Distribution of Age at Diagnosis:
KPNCR and General Population^a
1981-June 1987

Age at diagnosis	KPNCR		General population	
	Number	Percent ^b	Number	Percent ^b
Less than 14 years.....	1	0.1%	3	0.1%
15-29 years.....	129	14.1	582	14.5
30-39 years.....	366	40.1	1,985	49.5
40-49 years.....	270	29.6	993	24.8
50-59 years.....	110	12.0	343	8.6
60 years and over.....	37	4.1	102	2.5
Total.....	913 ^c	100%	4,008	100%

^aData are for a geographic area comparable to KPNCR's service area and include KPNCR cases.

^bPercentages may not total 100 due to rounding.

^cTwenty-seven of 940 cases are excluded because the date of diagnosis was unavailable.

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

of all AIDS patients in that they over-represent those who die soon after diagnosis. Thus, these results are underestimates of total lifetime hospitalizations for the average AIDS case.

Lifetable methods were used to obtain unbiased estimates of total lifetime hospitalizations and hospital days for all 913 cases (see Methods section above). These methods draw upon information for all 913 AIDS patients, living and dead, to estimate the distributions of lifetime hospitalizations and hospital days. This approach yielded a lifetime mean of 3.5 hospitalizations (± 0.15) and a lifetime mean of 39.3 (± 1.27) hospital days per case (table 4-5). Corresponding medians were 3.0 and 32, respectively. Patients whose initial diagnosis was PCP were hospitalized for longer periods than were KS patients; the mean length of hospitalization was 12.0 v. 10.6 days.

Table 4-4.--Initial Diagnosis for AIDS Patients^a

	Number	Percent ^b
PCP.....	588	62.6%
KS.....	143	15.2
Other AIDS-related infection.....	104	11.1
Other AIDS-related neoplasm.....	45	4.8
Other/unspecified AIDS-related diagnosis.....	60	6.4
Total.....	940	100%

^aFirst diagnosis appearing in any KPNC database.

^bPercentages may not total 100 due to rounding.

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

Table 4-5.--Estimated Lifetime Hospital Utilization by Initial Diagnosis in 913 AIDS Patients^{a,b}

Diagnosis	Number	Median	25th-75th percentile	Mean	Standard error
<u>Hospitalizations</u>					
PCP.....	588	3	2-4	3.4	0.19
KS.....	143	3	1-4	3.1	0.26
Other.....	182	3	1-5	4.3	0.46
Total.....	913	3	1-4	3.5	0.15
<u>Hospital days</u>					
PCP.....	588	32	18-56	41.0	1.64
KS.....	143	28	15-47	33.0	2.64
Other.....	182	32	17-60	38.4	2.73
Total.....	913	32	17-53	39.3	1.27

^aLifetable estimates are for the interval from diagnosis until death.

^bTwenty-seven of 940 cases were excluded due to unavailable date of diagnosis.

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

COST OF CARE

The preceding section presented hospital utilization data for 913 AIDS patients from their date of diagnosis through June 1987. The following cost analysis examines a sample of 30 of these patients. Their mean and median lifetime utilization and costs were estimated using survival methods.

Characteristics of the 30-Patient Sample

The sample of 30 AIDS patients was selected randomly from the 596 AIDS patients (63.4 percent) who had received care in the Kaiser Permanente San Francisco or Oakland hospitals (table 4-2).⁶ Each patient's medical records were reviewed thoroughly and their total utilization of Kaiser services, beginning one year prior to AIDS diagnosis, was re-

corded to derive costs for inpatient care, outpatient care, tests and procedures, and pharmacy prescriptions.

The 30 AIDS patients were representative of KPNC's population of 940 AIDS patients in the proportion still alive and in the health plan (43.3 percent v. 38.5 percent), and in total hospitalizations and hospital days (table 4-6). All 30 patients were men. Mean age at diagnosis was 37.6 years (range 24.7 to 54.6 years). Fourteen of these patients had an initial diagnosis of PCP (47 percent), eight had KS (27 percent) and another eight (27 percent) presented initially with other AIDS-related diagnoses.

A higher proportion of the sample was initially diagnosed with KS (27 percent) than the total group of 940 cases (15 percent). As mentioned above, many of the 940 patients were given the diagnosis associated with their first hospitalization. This practice probably misclassified some patients with the initial diagnosis of KS into other categories. The estimated mean survival time from diagnosis to death for the sample cases was 15.1

⁶ The sample was also restricted to patients diagnosed since Jan. 1, 1984, in order to reflect more recent utilization patterns while also allowing enough time for the disease to run its course.

Table 4-6.--Estimated Lifetime Hospital Utilization by Initial Diagnosis for the Sample of 30 AIDS Patients^a

Diagnosis	Number	Median	25th-75th percentile	Mean	Standard error
<u>Hospitalizations</u>					
PCP.....	14	3	1-5	3.1	0.6
KS.....	8	3	2-3	2.6	0.3
Other.....	8	4	2-6	4.2	0.9
Total.....	30	3	2-5	3.3	0.4
<u>Hospital days</u>					
PCP.....	14	37	20-67	41.4	8.6
KS.....	8	27	23-30	26.2	1.9
Other.....	8	30	23-47	33.0	6.2
Total.....	30	30	22-48	37.1	5.2

^a Lifetable estimates are for the interval from diagnosis until death.

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

months. Patients with an initial diagnosis of KS had an estimated mean survival of 19.1 months compared to 9.8 months for those with any other initial diagnosis.

Table 4-7 provides selected outpatient and hospital statistics for the sample of 30 AIDS patients.

Costs

Lifetime cost estimates for the sample of 30 AIDS patients are summarized in table 4-8.⁷ Because the application of survival methods to cost data may be unfamiliar to the reader, the key terms in the calculation of lifetime means and medians are presented in detail. The first column presents the total cost for each case in order of ascending cost and the second column indicates whether the corresponding cost is a final lifetime cost for a case who has died, or whether it is a total as of June 30, 1987, for a case who was then still alive and in the health plan. The third column, assigns a rank (j) to the 17 cases whose total costs are final lifetime totals. For each of these ranked cost levels, the fourth column indicates the number of patients who attained higher cost levels divided by the number who reached that level. (This column

estimates the conditional probability of surviving to cost more than the jth level, given attainment of that level.)

The fifth column results from multiplying the proportion in the fourth column by all the other proportions in the fourth column that are higher in the table. This product is an estimate of the proportion of all cases who would survive past cost level j and go on to attain higher cost levels, assuming they were all observed until death. The estimate of median lifetime cost is \$29,929, the cost level corresponding to the highest proportion in column 5 that is less than or equal to 0.50.

A plot of the column 5 proportions against the corresponding column 1 cost levels is known as a "survival curve." The sixth and seventh columns estimate the mean lifetime cost of AIDS care by calculating the area beneath this survival curve. The \$35,054 at the bottom of the last column is the area beneath the survival curve and an estimate of mean lifetime cost. The standard error for this mean is \$4,245. The median cost was somewhat lower at \$29,929, suggesting that the distribution of costs was skewed toward the higher amounts (i.e., that a few patients with very high costs increased the mean).

Estimates of median and mean lifetime costs by service category are presented in table 4-9. The use of inpatient services by AIDS patients was about three times as much

⁷ All cost data were measured in actual dollars.

Table 4-7.--Estimated Lifetime Utilization by Service Category for the Sample of 30 AIDS Patients^a

Service	Median	25th-75th percentile	Mean	Standard error
Outpatient				
Clinic visits.....	14	17-99	47.3	8.0
Prescriptions.....	29	10-54	29.4	4.2
Lab/procedures.....	69	24-121	69.1	8.6
Hospital				
Hospitalizations.....	3	2-5	3.3	0.4
Hospital days.....	30	22-48	37.1	5.2
Lab/procedures.....	102	82-210	149.7	24.1

^aLifetable estimates are for the interval from diagnosis until death.

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

Table 4-8.--Calculation of Product-Limit Estimates of the Distribution of Lifetime Costs of Care for AIDS: Sample of 30 AIDS Patients

(1) Cost	(2) Alive & in plan	(3) Rank j	(4) Cases surviving j/cases surviving to j	(5) Estimated past proportion of all cases who survive past j	(6) Cost at j minus cost at j-1	(7) Area under survival curve to j
0			30/30	1.00		
\$ 2,549	Yes	--	--	--	--	--
\$ 3,154	Yes	--	--	--	--	--
\$ 5,036	Yes	--	--	--	--	--
\$ 6,649	Yes	--	--	--	--	--
\$ 8,281	Yes	--	--	--	--	--
\$ 8,573	Yes	--	--	--	--	--
\$12,208	Yes	--	--	--	--	--
\$14,424	Yes	--	--	--	--	--
\$15,877	No	1	21/22	0.95	\$15,877	\$15,877
\$16,016	Yes	--	--	--	--	--
\$16,129	No	2	19/20	0.91	\$ 252	\$16,118
\$16,607	No	3	--	0.86	\$ 477	\$16,551
\$18,623	No	4	17/18	0.81	\$ 2,016	\$18,283
\$19,564	Yes	--	--	--	--	--
\$23,164	No	5	15/16	0.76	\$ 4,541	\$21,968
\$23,419	Yes	--	--	--	--	--
\$27,097	Yes	--	--	--	--	--
\$28,660	No	6	12/13	0.70	\$ 5,495	\$26,148
\$28,861	No	7	11/12	0.64	\$ 202	\$26,289
\$29,735	No	8	10/11	0.59	\$ 873	\$26,851
\$29,898	No	9	9/10	0.53	\$ 163	\$26,947
\$29,929	No	10	8/9	0.47	\$ 31	\$26,964
\$29,993	No	11	7/8	0.41	\$ 64	\$26,993
\$33,343	No	12	6/7	0.35	\$ 3,349	\$28,365
\$33,749	No	13	5/6	0.29	\$ 406	\$28,508
\$34,338	No	14	4/5	0.23	\$ 588	\$28,680
\$36,475	No	15	3/4	0.18	\$ 2,138	\$29,180
\$58,386	No	16	2/3	0.12	\$21,911	\$33,027
\$60,728	Yes	--	--	--	--	--
\$75,711	No	17	0/1	0.00	\$17,325	\$35,054

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

Table 4-9.--Estimated Lifetime Costs of AIDS for the Sample of 30 AIDS Patients^a

Service	Median	25th-75th percentile	Mean	Standard error
<u>Outpatient</u>				
Clinic visits.....	\$ 3,311	\$ 1,722-\$ 5,557	\$ 4,025	\$ 780
Prescriptions.....	\$ 1,326	\$ 195-\$12,919	\$ 5,218	\$1,216
Lab/procedures.....	\$ 1,113	\$ 674-\$ 2,351	\$ 1,226	\$ 174
<u>Hospital</u>				
Hospitalizations.....	\$14,430	\$ 9,881-\$22,607	\$719,223	\$2,991
Pharmacy.....	\$ 3,796	\$ 2,594-\$ 6,073	\$ 4,635	\$ 669
Lab/procedures.....	\$ 3,547	\$ 2,279-\$ 4,640	\$ 3,432	\$ 403
All services.....	\$29,929	\$28,660-\$34,338	\$ 35,054	\$4,245

^aLifetable estimates are for the interval from diagnosis until death.

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

as outpatient services. For outpatient pharmacy, the mean costs substantially exceeded the median because a few longer lived patients accumulated high costs from AZT use. (The wholesale cost of AZT was \$9,825 per year. AZT patients also incur extensive laboratory work.) Laboratory tests were frequently performed, but along with less common procedures (e.g., bronchoscopy, lumbar puncture), were not a major cost factor.

Patients with a primary diagnosis of PCP had higher mean lifetime costs (table 4-10) than those with other presenting diagnoses, due largely to their greater hospital utilization (table 4-7). Outpatient costs were lower for PCP (mean = \$4,589 $\pm$ 740) than for KS (mean = \$6,376 $\pm$ 1,355) or other diagnoses (mean = \$7,546 $\pm$ 1929). Given the small size of the three diagnostic subgroups, the differences between the subgroups are suggestive, but not statistically significant.

Annual costs per patient were calculated for three time periods--1984-85, 1986, and the first half of 1987--to look for trends in the costs of AIDS care. Total costs and hospital costs changed little from the first to the second period, but fell 20 percent and 36 percent respectively in 1987. The drop in hospital costs may be attributable to the establishment, in March 1986, of an outpatient unit (known as the Infusion Center) at Kaiser

Permanente's San Francisco hospital.⁸

In contrast, annual outpatient pharmacy costs climbed markedly from \$386 per person during 1984-85 to \$2,423 in 1986 and \$4,477 in 1987. This reflects the introduction of AZT as an outpatient treatment for AIDS during 1986. As noted earlier, the wholesale cost of AZT was \$9,825 per year.

Total costs per AIDS patient for a single year of care averaged \$25,119 from 1984 through June, 1987. The product of the annual costs per case (\$25,119) and the number alive at mid 1987 (346) gives an estimate of the total cost of care for all AIDS patients in 1987 (\$8,691,174). Furthermore, if the incidence of AIDS and survival time increased during this time, the use of the number of cases alive at the midpoint of the year underestimates the average number alive during the year. This could also lead to an underestimate of total costs.

⁸ The Infusion Center provides intravenous (IV) medication to patients who would otherwise need to be hospitalized. Ninety-five percent of its users are AIDS patients. Two registered nurses are dedicated to operating the Infusion Center 5 days a week. An average of 16 AIDS patients are treated in the Infusion Center daily. In its first 18 months of operation this center saved an estimated 3,500 inpatient days.

Table 4-10.--Estimated Lifetime Costs by Initial AIDS-Related Diagnosis for the Sample of 30 AIDS Patients^a

Diagnosis	Number	Median	25th-75th percentile	Mean	Standard error
PCP.....	14	\$33,343	\$23,164-\$58,386	\$39,785	\$7,166
KS.....	8	\$29,735	\$28,861-\$29,993	\$27,348	\$2,268
Other.....	8	\$34,338	\$29,929-\$36,475	\$30,186	\$3,796
Total.....	30	\$29,929	\$28,660-\$34,338	\$35,054	\$4,245

^aLifetable estimates are for the interval from diagnosis until death.

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

Because there is no systematic way to identify Kaiser members who have been diagnosed with AIDS-related complex (ARC) or are HIV seropositive, it is not possible to estimate their costs of care. ARC cases are frequently not documented as such in any of the computerized databases and the identity of members who are HIV seropositive are protected by State confidentiality requirements. California law also prohibits mandatory testing. Clearly, these patients also contribute to KPNCr AIDS-related costs.

Impact on 1988 Rates

Limitations in KPNCr's cost accounting and data systems make it difficult to precisely measure the overall impact of AIDS-related care on the 1988 basic rate. The ratesetting forecast for 1988 includes 14,120 patient days related to AIDS or ARC. This represents 2.0 percent of the total adult and pediatric patient day forecast, or more than \$8.6 million.⁹ Given the relationship of AIDS inpatient costs to other services (e.g., outpatient visits and ancillary services) that were outlined above, the impact of AIDS/ARC on the basic rate is in excess of \$0.55 per member per month, exclusive of the cost of AZT. \$0.55 per member per month represents approximately 0.8 percent of KPNCr's non-Medicare dues rate for 1988. Given the current emphasis by employers and the Federal government on health care cost containment, virtually all rate increases will have a significant impact on KPNCr's ability to attract and retain members.

The impact on the outpatient pharmacy supplemental benefit rates was calculated based on estimates of the utilization of AZT within the member population and across drug plans. AZT coverage in the outpatient pharmacy benefit added \$0.17 per member

per month to the loading for the pharmacy benefit. In addition, it was assumed that providing AZT to patients who are without supplemental drug plans and unable to make full payment would result in an approximately \$500,000 to \$700,000 revenue shortfall. This revenue shortfall was added to the basic rate.

It is theoretically possible to continue adding to the basic rate to cover increases in AIDS costs, but employers have expressed great reluctance to pay for AIDS-related care through their premiums and are demanding experience-based rates that reflect only the costs of their own employees. At present, HMO Federal qualification prohibits experience-rating.¹⁰ Eighty-eight percent of the total membership is affiliated with employer groups.

Forecast of AIDS Cases and Costs

Table 4-11 presents the numbers of incident AIDS cases within KPNCr for 1981-1986 and projects incidence for 1987 through

10 Federal legislation to modify this requirement is currently under consideration.

Table 4-11.--New Cases of AIDS From 1981-1990

Year	Number of new cases	Percentage increase in cases
1981-1983.....	85	
1984.....	118	
1985.....	210	1.78
1986.....	300	1.43
1987 (est.)....	429	1.39
1988 (est.)....	582	1.35
1989 (est.)....	757	1.30
1990 (est.)....	960	1.27

9 Note that the \$8.6 million is the 1988 projected cost for inpatient services only and is a significant increase from the estimated 1987 inpatient cost of \$5.7 million. These costs are consistent with those estimated using survival analysis methods (see Methods section above).

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

1990. Estimates for 1987 through 1990 assume the annual percentage increase in cases projected for California by the Centers for Disease Control (CDC) using the model presented at the Coolfont Conference in June 1986 (see appendix C). A total of 2,501 new AIDS cases are forecast for July 1987 through 1990.

Assuming mean lifetime costs of \$35,054, the costs for providing care to these patients will be \$87.7 million. This estimate does not consider inflation, additional costs incurred as life-extending therapies are developed, costs of care for infected patients who do not yet fulfill the diagnostic criteria for AIDS (i.e., patients with ARC or HIV seropositivity), or changes in the cost of care resulting from new alternative health care arrangements.

Comparison With Other Cost Studies

The mean lifetime cost of \$35,054 differs from other published estimates. In one study, lifetime inpatient charges were estimated to be \$27,571 for 85 patients who died at San Francisco General Hospital in 1984 (15). Another report cited medical costs of \$46,505 per year for 45 patients in Massachusetts studied in 1984-85 (14). Other estimates have suggested that individual costs may be as high as \$147,000 based only on hospital charges (4). In comparing these disparate estimates, several factors deserve attention:

- 1) the number of hospital days per patient,
- 2) the per diem cost of a hospital day,
- 3) whether ambulatory services are included,
- 4) the calendar year during which care was delivered, and
- 5) the statistical methods used to derive estimates.

The number of hospital days for an AIDS patient is the largest single contributor to costs. The estimate of 37.1 mean lifetime hospital days in the sample of 30 AIDS

patients (39.3 days among all KPNCR AIDS patients) is somewhat higher than that of Scitovsky et al., who reported a mean of 34.7 days per patient at San Francisco General Hospital. However, Scitovsky et al. studied only persons who had died. Using this approach, the Kaiser mean lifetime hospital days were 33.4 days per patient.

Seage et al. estimated a mean of 61.7 lifetime hospital days per patient in Massachusetts, 66 percent more than in this study. In general, data from the Northeast suggest significantly longer hospital stays per patient than San Francisco-based studies (2). This could be due to differences in the casemix between regions. For example, a higher proportion of intravenous drug users are generally reported in the Northeast (2). Such patients are more likely to present with opportunistic infections other than with KS, a factor clearly related to increased hospital days in these data and those of others. Moreover, these patients may have less extensive personal support networks to provide alternatives to hospitalization. In New York City, about 15 percent of the AIDS patients hospitalized in municipal hospitals are homeless (3). The San Francisco Bay area may also provide more community support services than other areas (15).

The dollar value of an inpatient day also differs among these studies. Per diem, "fully loaded" medical-surgical costs in the two KPNCR hospitals studied were about \$400 in 1986 dollars.¹¹ The San Francisco General Hospital's charges for a regular bed were \$662 in 1984 dollars. Charges in the Massachusetts study were also approximately \$650 per day in 1984. (See the discussion of unit cost calculation in the Methods section.)

¹¹ The \$400 includes overhead costs such as: capital related costs, employee benefits, administrative and general, maintenance and repairs, operation of plant, linen and laundry, housekeeping, dietary, cafeteria, nursing administration, central supply, medical records, social service, health plan administration, and residents' salaries and benefits. Pharmacy costs, usually a part of the allocation process, are specifically excluded and treated as a separate cost area.

Ambulatory as well as inpatient utilization has been included in this study in contrast with the analyses of Scitovsky et al. and Hardy et al. Every effort was made to account for all provided services including psychiatric, hospice, and home health services, as well as "out-of-area" services furnished by non-Kaiser providers.

It is not surprising that costs may differ year to year. For example, the introduction of new medication (i.e., AZT and pentamidine) increased pharmacy costs dramatically. In contrast, hospital as well as total costs decreased in 1987, perhaps due to the opening of the Infusion Center at the San Francisco hospital in May of 1986. In its first 18 months of operation, the Infusion Center saved an estimated 3,500 inpatient days.

The use of survival analysis methods in this analysis contrasts with studies that estimate lifetime costs or utilization based only on persons who have expired. The lifetable method appropriately yielded higher cost estimates.

Finally, to be consistent with other analyses, the mean and median lifetime estimates of utilization and cost in this report extend from the date of diagnosis until death. From the date of the first AIDS symptom recorded in the medical chart (instead of diagnosis) until death, the estimated mean cost of care for AIDS patients is \$37,897 and the estimated median cost is \$31,796 compared to estimated mean costs of \$35,054 and estimated median costs of \$29,929 from time of diagnosis until death.

5. CONCLUDING COMMENTS

As of mid-1987, the Kaiser Permanente Northern California Region (KPNCR) did not have a disproportionate share of AIDS cases; its share of northern California AIDS cases (23.7 percent) was almost equivalent to the proportion of northern California residents enrolled in its health plan (25 percent). However, on a national basis, Kaiser Permanente's share of AIDS cases may exceed that of other national carriers, because it attracts such a significant proportion of its enrollment from northern California. This impact may eventually affect Kaiser Permanente's ability to compete, especially in instances where the buyer seeks geographically broad-based coverage alternatives, such as in the Federal Employees Health Benefits Plan or in other national or Statewide organizations.

KPNCR believes that it is extremely vulnerable to future adverse selection for several fundamental reasons, including the following:

- o As a federally qualified health maintenance organization, KPNCR is required to enroll all group-sponsored applicants regardless of preexisting conditions. In contrast, many indemnity insurers and self-insured employers are able to limit coverage of preexisting conditions or otherwise restrict the coverage of AIDS.
- o KPNCR's conclusion that its benefit package is generally more comprehensive than its competitors' and therefore more attractive to enrollees who perceive themselves at high risk of disease.
- o KPNCR research indicating that a disproportionate share of its AIDS cases are among individual or small group

members. Only a few of KPNCR's competitors are currently active in the individual or small group markets. Consequently, over time, the program may have a disproportionate number of individual and small group AIDS-related cases. This situation may be aggravated if self-insured employers are free to determine whether they will cover the costs of treating AIDS patients.

KPNCR contends that as the AIDS epidemic continues, a growing number of insurers and employers may be motivated to take action to avoid covering the high cost of treatment for AIDS patients. KPNCR believes that there are already many signs that this is occurring, including legislative controversies over the use of human immunodeficiency virus test results to exclude high-risk persons from coverage, the use of other tests (e.g., T-cell subset studies) to screen high-risk persons, and modifications in other insurers' marketing strategies to reduce exposure.

KPNCR believes that legislative action may be necessary to address the breakdown of health insurance coverage for AIDS and suggests that legislation not only could create a financing mechanism for AIDS patients who do not have health benefits coverage but also could assure that no single segment of the health benefits industry bears a disproportionate share of the AIDS burden. Such legislation, KPNCR believes, should provide incentives for health benefits plans to maintain or increase their enrollment of persons with AIDS rather than avoid covering them, and legislation should also encourage providers to deliver high-quality and cost-effective AIDS-related care.

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Appendix A: KAISER PERMANENTE MEDICAL CARE PROGRAM

BACKGROUND

The Kaiser Permanente Medical Care Program (KPMCP) is a private, nonprofit, health care program that provides prepaid medical and hospital services to more than five million people in 16 States and the District of Columbia. It also enrolls individuals and groups and accepts the risk for both the cost and volume of services.

The Kaiser Permanente Northern California Region (KPNCR) operates 14 hospitals and 26 outpatient medical offices, with 2,364 physicians and over 21,000 employees. It serves a total membership of more than 2 million people, 25 percent of the area's population. The range of resources and scope of services offered by the program qualify KPNCR as one of the largest and most comprehensive private sector health care delivery systems anywhere. A map of the service area is shown in figure A-1.

This appendix provides background information on the KPNCR organization, its membership, benefits, ratesetting, utilization patterns, and market competition.

ORGANIZATION

KPNCR consists of three entities: Kaiser Foundation Health Plan, Inc. (KFHP), The Permanente Medical Group, Inc. (TPMG), and Kaiser Foundation Hospitals (KFH). KFHP is a California nonprofit, public-benefit corporation. It is an administrative and contracting organization with functions that include enrolling members, maintaining membership records, collecting payments, and contracting with TPMG and KFH for professional and hospital services. As a federally qualified health maintenance organization (HMO), the health plan:¹

- is required to provide basic health services, including physician and inpatient hospital services, rehabilitation and physical therapy, outpatient mental health services, alcohol and drug abuse treatment, laboratory and radiology, home health, and preventive health care;
- is not permitted to have deductibles for basic health services and is limited as to the amount of copayment that can be charged for these basic health services;
- is required to enroll all group sponsored applicants;
- must use community rating for non-government groups.

KPNCR is also regulated by the California State Department of Corporations under the Knox-Keene Health Care Services Plan Act of 1976. The act mandates basic benefits and copayment limitations similar to those of the Federal act but does not require community rating. California health care service plans that are not federally qualified HMOs are permitted to experience-rate. The State Act also permits non-federally qualified HMOs to establish preexisting condition clauses for group enrollment.

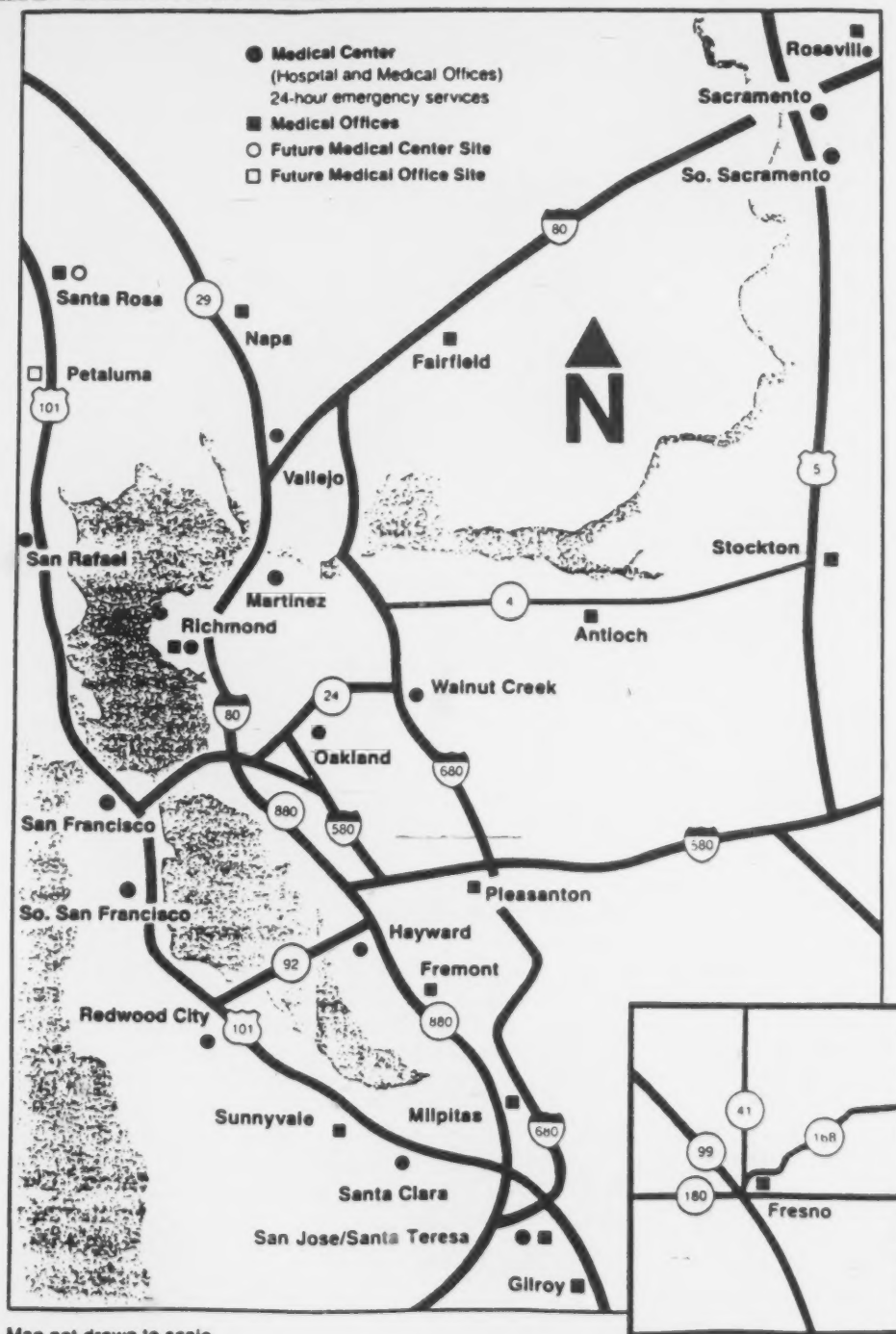
KFH is a California nonprofit, charitable corporation and is obligated through contract to provide or arrange health care facilities for KFHP members.

TPMG is a for-profit California professional corporation. It is composed of physicians, representing the major specialties in medicine, who practice at KFH facilities, where the staff and equipment necessary for diagnosis and treatment are provided. TPMG is compensated by KFHP with an annually negotiated amount per member per month; physicians are not compensated on the basis of individual services provided. The relationship between TPMG and KFHP is exclusive.

¹ Federal legislation to liberalize some of these requirements is currently under consideration.

Figure A-1.--KPNCR Service Area Map

NORTHERN CALIFORNIA REGION



MEMBERSHIP

Growth within KPNCR has been steady, with the addition of both medical centers and freestanding medical offices paralleling increases in membership. As of the end of 1986, membership totaled 2,016,990 (figure A-2). Table A-1 details KPNCR membership by age and sex for the years 1980 and 1986.

The majority of KPNCR members are group members. In 1986, 88 percent of members were affiliated through employer groups, and 12 percent were enrolled as individual members. The breakdown of group versus individual membership has remained relatively stable since 1975 (table A-2).

Elements of a Group

In order to qualify for health plan group membership, potential subscribers must meet one of three conditions. They must be employees of one common carrier, working partners and their employees, or eligible for coverage through Health and Welfare Trust

Funds established through collective bargaining arrangements. (Association plan enrollment is also available on a medical review basis to organizations that do not meet the criteria for group health plan coverage.)

Table A-1.--Percent Distribution of Membership by Age and Sex^{a,b} 1980 and 1986

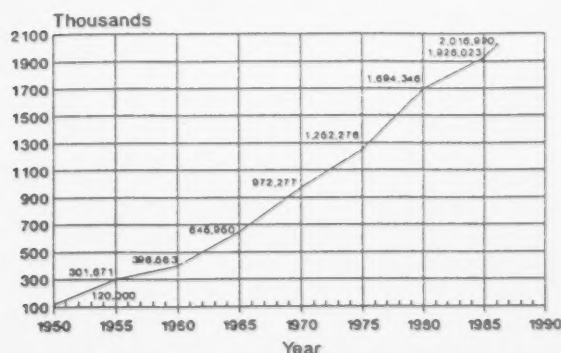
Age	1980	1986
Males		
Under 65.....	11.8%	11.1%
0-14.....	5.0	4.2
15-19.....	20.3	20.3
20-44.....	9.3	9.8
45-64.....	46.4	45.4
Over 65.....	2.6	3.5
Total.....	49.0%	48.8%
Females		
Under 65.....	48.1%	47.3%
0-14.....	11.3	10.6
15-19.....	4.9	4.1
20-44.....	22.3	22.2
45-64.....	9.6	10.3
Over 65.....	2.9	3.9
Total.....	50.9%	51.2%
Males and females		
Under 65.....	94.5%	92.6%
0-14.....	23.1	21.7
15-19.....	9.8	8.3
20-44.....	42.6	42.5
45-64.....	19.0	20.1
Over 65.....	5.5	7.4
Total.....	100.0%	100.0%

^aThe percentages reflect average health plan membership.

^bPercentages may total 100 due to rounding.

SOURCE: Kaiser Permanente (Northern California Region), "Annual Statistical Review," unpublished internal document, Oakland, CA, 1980 and 1986.

Figure A-2.-Kaiser Foundation Health Plan Membership Northern California Region



SOURCE: Kaiser Permanente (Northern California Region), "Facts 1987," internal document, Oakland, CA, 1987.

There are several other conditions that apply to group membership:

- Groups must be composed of five subscribers or of one subscriber in a group of 25 or more eligible employees that offers dual or multiple choice of health plans to employees;²
- At least half of the monthly subscriber premium rate must be contributed by the employer. This makes the employer a participant in providing health care and creates an incentive for the employer to include only eligible employees in the group;

² A "subscriber" is the head of the family unit and in whose name membership is obtained. This is in contrast to a "member," defined as any individual who is entitled to KPNC services.

- Employees must work a minimum of 20 hours per week or be permanent part-time employees. This is also an incentive for the employer to include only eligible employees in the group;
- All new groups with 50 or more potential subscribers must have dual choice arrangements. This corresponds with KPNC's principle of voluntary enrollment; and
- A majority of the eligible subscribers of a group must be covered by Workers' Compensation. This increases the likelihood that work-related injuries and illness will be covered under Worker's Compensation rather than under the KPNC benefits.

Table A-2.--Number and Percentage Distribution of Group and NonGroup Members for Selected Years: 1965 to 1986^a

Northern California (as of Dec. 31)	Number of members (in thousands)			Percent distribution	
	Group membership	Nongroup membership	Total	Group	Nongroup
1965.....	531.8	114.1	645.9	82%	18%
1970.....	844.9	127.4	972.3	87	13
1975.....	1123.5	128.8	1252.3	90	10
1980.....	1521.6	172.8	1694.3	90	10
1985.....	1751.1	224.8	1976.0	89	11
1986.....	1784.7	232.8	2017.0	88	12

^aData include members of families who contract individually with the health plan either by direct enrollment or by conversion from a health plan group.

SOURCE: Kaiser Permanente (Northern California Region), "Annual Statistics Review," unpublished internal document, Oakland, CA, 1986.

Elements of Individual Membership

The Federal HMO Act and California's Knox-Keene Act require HMOs to offer members who are leaving their employer-sponsored groups an option to convert to an individual (or "direct-pay") plan. KPNCr is one of a few northern California HMO/PPO health carriers that offer health plans to individuals who are not converting from their carrier's group plan. Only 5 of 19 competing health plans allow non-conversion individual enrollment.

Eligibility

There are two types of direct-pay members. "Conversions" are individuals who leave an existing group and want to retain their program membership. "Direct enrollments" initiate membership with KPNCr independent of prior group membership.

Conversions face no medical restrictions upon applying for direct-pay membership. However, they are required to choose KPNCr's conversion coverage within a specified time after their group enrollment ends. Fifty-seven percent of direct-pay members are conversions.

Direct enrollment applicants must complete an application and a medical history form (figure A-3). Applicants indicating a history of health care problems are either rejected outright or asked to have a physical examination by TPMG physicians. All applicants over 46 years of age also must undergo a physical examination. The criteria used to determine an individual applicant's eligibility are applied uniformly, regardless of age, occupation, or sex, and are typical of general health insurance practices. Overall,

approximately 20 percent of direct enrollment applicants are rejected. (This percentage has remained constant over time.)

BENEFITS³

Group Members

Basic benefits for group coverage include physician office visits, hospital services, X-rays, laboratory tests, immunizations, and eye exams. In addition, limited coverage for extended care in a skilled nursing facility; neuromuscular rehabilitation; physical, speech, and occupational therapies; hemodialysis; organ transplants; bone marrow transplants; home health services, alcoholism, drug abuse, or addiction treatment; and mental health care are included in the plan.

KPNCr offers several benefit packages for groups. Basic benefit packages generally differ in two ways: 1) registration charge (i.e., outpatient visit fee) and 2) selection of supplemental benefits.⁴

The office visit registration charge for medical services ranges from no charge to \$20. The registration charges applied to specific services and the designated ranges of these charges are summarized in table A-3.

Supplemental benefits are optional and go beyond the HMO benefits required by Federal and State statutes. Supplemental benefits can either be the extension of a basic benefit or the incorporation of a new benefit, such as an outpatient prescription drug

³ This section provides an overview of KPNCr's basic non-Medicare benefits and should not be interpreted as a definitive list of contractual benefits.

⁴ Employers determine which supplemental benefits are offered to employees.

Figure A-3.--KPNCR Application for Membership-Medical Questionnaire

 KAISER PERMANENTE		Kaiser Foundation Health Plan, Inc. Northern California Region Mailing Address: P.O. Box 12938 Oakland, California 94604		DO NOT WRITE IN THIS SPACE Medical No. _____	
APPLICATION FOR MEMBERSHIP - MEDICAL QUESTIONNAIRE				SUBSCRIBER	
INSTRUCTIONS: Use ink or typewriter to complete questionnaire and use a SEPARATE questionnaire for each member of your family who is applying for membership. ALL QUESTIONS MUST BE ANSWERED. ALL QUESTIONNAIRES MUST BE SIGNED. INCLUDE A CHECK FOR THE NONREFUNDABLE PROCESSING FEE. DO NOT SEND CASH.					
ANY MISREPRESENTATION OF THE PRESENCE OF PRE-EXISTING IMPAIRMENT OR DISEASE WILL VOID YOUR COVERAGE.					
I hereby apply for membership in the Kaiser Foundation Health Plan, based on the following:					
1. NAME - First		MIDDLE		LAST	
2. HOME PHONE		3. WORK PHONE			
4. ADDRESS (NUMBER & STREET)		5. AGE		6. BIRTHDATE	
7. CITY		STATE		ZIP	
8. SEX ☐ MALE ☐ FEMALE		9. Height without shoes _____ ft., _____ inches		10. Weight, undressed _____ lbs.	
11. NAME OF EMPLOYER		OCCUPATION (please describe what you do)			
12. ☐ Yes ☐ No		Were you previously a member of the Kaiser Foundation Health Plan?			
		If Yes, give group number or name _____			
		and Medical Record Number if known _____			
		When did your former membership begin _____ and end _____			
13. ☐ Yes ☐ No		Have you ever been treated or examined at a Kaiser Permanente Medical Center?			
		If Yes, list location and date of last exam or treatment: _____			
		If seen using a different name or maiden name, give name: _____			
14. ☐ Yes ☐ No		Have you ever been rejected for medical insurance including Kaiser Foundation Health Plan, or been offered insurance at a higher (rated up) premium?			
		If Yes, please explain _____			
15. ☐ Yes ☐ No		Were you ever rejected from military service or discharged from military service for medical or psychological reasons?			
		If Yes, please explain _____			
16. ☐ Yes ☐ No		Do you regularly drink alcohol? ☐ Beer ☐ Wine ☐ Hard Liquor			
		If Yes, how much? _____			
☐ Yes ☐ No		Do you smoke? If so, how much per day? _____ How long have you smoked? _____			
		IF YOU QUIT, how many years did you smoke? _____ How long since you've quit? _____			
17. Date of last physical examination: _____		Please check the examination received: ☐ routine examination			
		☐ OB-GYN (Obstetrics-Gynecology)			
		☐ Other (please specify) _____			
		Name and address of examining physician: _____			
18. ☐ Yes ☐ No		Have you ever been advised to have surgery which you have not yet undergone?			
		If yes, give details: _____			
19. How many times have you visited a physician in the last year? _____		Please list reasons for visits (symptoms, complaints, etc.) _____			
QUESTIONS TO BE ANSWERED FOR ALL FEMALE APPLICANTS OVER THE AGE OF 13.					
20. Date of your last menstrual period: _____		21. ☐ Yes ☐ No		Are you now pregnant?	
		MO. DAY YEAR			

Figure A-3.--KPNCR Application for Membership-Medical Questionnaire (Cont'd)

22. Have you ever been hospitalized, diagnosed or treated for any of the following? Please place a check (✓) in the Yes or No column.
EVERY ITEM MUST BE CHECKED. IF YES, EXPLAIN BELOW IN NUMBER

Yes No

- ☐ ☐ Alcoholism
☐ ☐ Serious anemia or other blood diseases
☐ ☐ Arthritis, gout, or painful joints
☐ ☐ Asthma / wheezing
☐ ☐ Chronic cough, emphysema or other chronic lung diseases
☐ ☐ Back ache or back injury
☐ ☐ Serious bodily injury or disability
☐ ☐ Cancer, leukemia or tumors
☐ ☐ Convulsions, seizures or epilepsy
☐ ☐ Diabetes or sugar in urine Medication: ☐ Oral ☐ Injection
☐ ☐ Diarrhea or colitis (chronic) Rectal bleeding or other rectal ailment
☐ ☐ Ear problems or loss of hearing
☐ ☐ Tubes now present in ears for otitis media
☐ ☐ Eye condition (cataract, intis, etc.)
☐ ☐ Glaucoma
☐ ☐ Gallbladder stones ☐ Yes ☐ No Surgically removed
☐ ☐ Goiter or thyroid condition
☐ ☐ Hay fever or allergies
☐ ☐ Currently on allergy injections
☐ ☐ Headaches (disabling) or migraine

Yes No

- ☐ ☐ Heart attack or other heart trouble
☐ ☐ Heart murmur
☐ ☐ Hypertension or high blood pressure
☐ ☐ Hernia (rupture) ☐ Yes ☐ No Surgically repaired
☐ ☐ Immunological deficiency, such as Acquired Immune Deficiency Syndrome (AIDS), Aids-related complex (ARC)
☐ ☐ Ulcers of stomach or duodenum
☐ ☐ Venereal Disease
☐ ☐ Persistent indigestion or peptic symptoms
☐ ☐ Kidney condition, kidney stones
☐ ☐ Loss of urine control, bladder problems, or difficult urination
☐ ☐ Prostate problems
☐ ☐ Liver conditions ☐ Cirrhosis ☐ Jaundice ☐ Hepatitis
☐ ☐ Paralysis / Strokes
☐ ☐ Serious skin disease, melanoma, psoriasis
☐ ☐ Female organ abnormality
☐ ☐ Irregular vaginal bleeding
☐ ☐ Mental / emotional disorders
☐ ☐ Psychiatric counseling
☐ ☐ Drug addiction or abuse (Please specify) _____

23. ☐ Yes ☐ No Have you ever been treated or are you being treated for any other condition not listed above? Please describe: _____

24. ☐ Yes ☐ No Do you have or have you had unexplained and / or undiagnosed symptoms such as weight loss, swollen glands, fever, skin lesions, rash or rectal problems? If yes, please explain: _____

25. ☐ Yes ☐ No Are you currently taking medications for any of the conditions noted in items 22 or 23? If Yes, list medicines: _____

☐ Yes ☐ No Are you currently or regularly taking any other medications or drugs? If Yes, please list: _____

26. ☐ Yes ☐ No Are any of the above conditions now present? If Yes, which condition(s)? _____

27. If Yes is checked for any condition in items 22 through 26, give details below:

CONDITION	HOSPITAL NAME (if hospitalized)	ATTENDING PHYSICIAN	PHYSICIAN'S ADDRESS	Date of Last TREATMENT

(IF ADDITIONAL SPACE IS NEEDED PLEASE ATTACH AN EXTRA SHEET.)

This medical questionnaire must be updated to include any condition or disease which occurs after the date of submission of this application and prior to Kaiser Foundation Health Plan's acceptance. Failure to provide this information to Kaiser Foundation Health Plan will constitute a misrepresentation of the presence of a pre-existing condition or disease and may void your coverage. Acceptance of the nonrefundable processing fee by Kaiser Foundation Health Plan does not constitute acceptance of your application as a Health Plan member. The Health Plan reserves the right to reject any applicant and is not obligated to disclose the reason for rejection.

I hereby certify that the foregoing answers are true and complete and to the best of my knowledge my health is accurately represented in the above statements. I understand that Health Plan may require me to have a physical examination, and I authorize the release of any information from such examination to Health Plan for use in considering my application. I also understand and agree that whenever necessary in the administration of the Service Agreement, Kaiser Permanente physicians may discuss with Health Plan medical information related to this application.

I apply for Health Plan membership and agree that I shall abide by the provisions of the Service Agreement and Health Plan regulations. I understand that the Service Agreement provides that all claims, including medical malpractice claims, which arise because I, or someone with a relationship to me, believe that some conduct in, or arising from, my relationship with Kaiser Foundation Health Plan, Inc., Kaiser Foundation Hospitals or The Permanente Medical Group, Inc., as a member or as a patient, has caused any harm, are subject to binding arbitration.

(In the event the applicant is a minor, or is incompetent, the applicant's name should be entered on the "Signature of Applicant" line, and the parent or guardian should sign where indicated.)

IMPORTANT: ALL QUESTIONS MUST BE ANSWERED. APPLICATION WILL BE RETURNED IF ANY QUESTION IS NOT ANSWERED.

SIGNATURE OF APPLICANT DATE

SIGNATURE OF PARENT OR GUARDIAN DATE

Table A-3.--Registration Charges for Selected Services

Service	Range of charges
Outpatient physician visits including eye exams.....	No charge to \$5
Xrays and laboratory work.....	No charge to \$5
Inhalation, occupational, or physical therapies.....	No charge to \$5
Physician house calls.....	No charge to \$5
Mental health visits.....	No charge to \$20

SOURCE: Kaiser Permanente (Northern California Region), unpublished data, Oakland, CA, 1988.

benefit or hearing aid coverage. The supplemental benefits available to most groups are: 1) outpatient prescription drugs and certain accessories (e.g., syringes), 2) eye glass and contact lens coverage, 3) hearing aid coverage, 4) durable medical equipment, and 5) dependent coverage options.

Seventy-six percent of KPNCRC's enrolled members have a drug benefit. Table A-4 details the types of available pharmacy coverage, member charges per prescription, average monthly cost, and member participation rate.

Table A-4.--Description of Prescription Drug Plans

Drug plan code	Member pays	Average monthly subscriber cost ^a	Participation rate ^b
1	Blue Book ^c (\$1 minimum).....	\$3.26	7.2%
2	\$1 charge per prescription for (whichever is greater): 34 days' supply (or one cycle of a contraceptive drug) or manufacturer's smallest package.....	9.20	60.4
4	\$1 charge per prescription for (whichever is greater): Other than contraceptives: 100 days' supply or manufacturer's smallest package Contraceptives: One cycle or manufacturer's smallest package.....	9.08	1.4
5	\$3 charge per prescription for items as described in Plan Two.....	5.70	8.3
6	\$2 charge per prescription for items as described in Plan Two ^d	N/A	12.7
7	No charge for 100 day's supply or manufacturer's smallest package. Reasonable rates for purchase of excess of both of the above limitations.....	12.7	19.9
8	No charge for 100 days' supply or manufacturer's smallest package, whichever is greater.....	N/A	0.1

^aAddition represents incremental cost of drug option to self only subscriber, first quarter 1988.

^bPercent of all members participating in a drug plan, first quarter 1987.

^cThe price for which a wholesaler would sell the product to a retailer.

^dOnly offered to Federal employees.

^eOnly offered to Medi-Cal members under pilot project.

SOURCE: Kaiser Permanente (Northern California Region), internal marketing document, Oakland, CA, 1988.

Direct-Pay Members

Direct-pay members are offered the same basic benefits as group members. Two plans are available; however, direct-pay members converting from group coverage are limited to Plan I. The primary difference between the two plans is the outpatient office visit registration charge. Plan I registration charges are \$5 per visit for most office visits, versus \$15 per visit in Plan II. Neither plan offers an outpatient prescription drug benefit (except for members with part A and part B Medicare coverage).

Figure A-4 provides a comparison between Plan I and Plan II.

RATESETTING

KPNCR groups are community-rated. All groups with the same benefits and contract renewal date have rates that reflect the same community rate standards. Variations in prepaid rates from group to group reflect differences in benefits, contract renewal dates, and length of contract.

The method for calculating the base community rate (i.e., excluding supplemental benefits and administrative charges) for any year involves the following steps:

1. The total expenses (i.e., revenue requirement) for providing care is forecasted;
2. Revenue from all sources, including basic dues for contracts prior to renewing in the current year, is forecasted. In addition to basic dues before renewal, other revenue sources include Medicare, nonmember revenue, interest income, etc;
3. The shortfall between items 1 and 2 is divided by member-months for all groups after renewing their contracts for the current year. This is the per-

Figure A-4.--Individual Plan Programs

The following are the costs and benefits of the two Kaiser Foundation Health Plan Individual Plan programs available in 1987:

Benefits	Plan I	Plan II
In the hospital		
All physician and surgeon services	No charge	No charge
Intensive care/Cardiac care	No charge	No charge
Room and board	No charge	No charge
Laboratory and X-ray	\$3 per test or X-ray	\$5 per test or X-ray
Physical therapy	No charge	No charge
Other necessary services and supplies (including special nursing)	No charge	No charge
In the Doctor's Office		
(No age limit for any of these services)		
Office visits (includes routine physical exams, well-baby check-ups, and Ob/Gyn appointments)	\$5 per visit	\$15 per visit
Hearing and vision examinations	\$5 per visit	\$15 per visit
Physical therapy visits	\$5 per visit	\$15 per visit
Allergy tests and injection visits	\$3 per visit	\$3 per visit
Administered medications, injections, allergy testing and treatment materials	No charge	No charge
Laboratory and X-ray	\$3 per test or X-ray	\$5 per test or X-ray
Maternity Care		
Physician and paramedical office visits	\$5 per visit	\$15 per visit
Hospital services	No charge	No charge
Caesarean delivery	No charge	No charge
Complications of pregnancy	No charge	No charge
Prescription Drug Benefits		
Administered while in the hospital or in the doctor's office	No charge	No charge
Obtained at Plan pharmacies	Not covered	Not covered
Ambulance Service		
Authorized by a Plan physician	No charge	No charge
Mental Health Care		
Office visits:		
Up to 20 visits per calendar year	\$20 per visit	\$20 per visit
Group therapy	\$10 per visit	\$10 per visit
Hospitalization - Up to 45 days of inpatient care per calendar year	No charge	No charge
Alcoholism and Drug Dependency Care		
Office visits	\$5 per visit	\$15 per visit
Hospitalization - Limited to the removal of toxic substance(s) from the system	No charge	No charge
This is intended only as a general description of the plan's benefits. It is not a contract. For additional information on these and other benefits, please refer to this Plan's "Disclosure Form/Evidence of Coverage" or call a Service Representative at a Health Plan Office.		
1987 Monthly Charge		
	Plan I	Plan II
Subscriber Only	\$ 65.73	\$ 60.17
Subscriber and One Dependent	130.46	119.34
Subscriber and Two or More Dependents	178.05	161.81

SOURCE: Kaiser Permanente (Northern California Region), marketing brochure, Oakland, CA, 1987.

member-per-month (PMPM) increased revenue requirement for all contracts renewing in the current year;

4. The PMPM is converted into three step rates: subscriber only, subscriber plus one dependent, and subscriber plus two or more dependents. These rates, graduated by quarter, are applied to all groups as they renew in the current year.

Under community rating, KPNCR is at risk for the accuracy of its forecasts and for unexpected fluctuations in costs.

Revenues in excess of expenses and capital generation requirements are used to moderate rate increases in the future.

UTILIZATION PATTERNS

Table A-5 provides age-specific health plan utilization rates for 1986. KPNCR hospitals have experienced higher average occupancy rates than California hospitals as a whole. From 1976 through 1982, KPNCR hospitals followed the national patterns for average occupancy. However, in 1984 KPNCR hospitals did not experience the

Table A-5.--Age-Specific Health Plan Utilization Rates,
Calendar Year 1986

Age group (male and female)	Hospital days per 1,000 per year	Discharges per 1,000 per year	Average length of stay	Doctor office visits per 1,000 per year
0-64.....	235	54	4.4	3,359
0-14.....	92	25	3.7	3,710
0-4.....	177	44	4.0	6,399
5-9.....	44	14	3.1	2,660
10-14.....	58	17	3.5	2,182
15-19.....	136	37	3.7	2,320
20-44.....	235	62	3.8	3,098
20-24.....	220	68	3.3	2,873
25-29.....	289	86	3.4	3,340
30-34.....	248	67	3.7	3,241
35-39.....	208	48	4.3	2,941
40-44.....	207	42	4.9	3,087
45-64.....	433	76	5.7	3,962
45-49.....	261	49	5.3	3,250
50-54.....	352	65	5.5	3,814
55-59.....	481	84	5.7	4,073
60-64.....	698	115	6.1	4,930
65+.....	1,337	195	6.9	6,363
65-69.....	949	149	6.4	5,516
70-74.....	1,296	189	6.8	6,650
75-79.....	1,649	233	7.1	7,430
80-84.....	2,213	296	7.5	8,000
85+.....	2,928	395	7.4	6,298
Total.....	317	64	4.9	3,581

SOURCE: Kaiser Permanente (Northern California Region), "Annual Statistical Review," unpublished internal document, Oakland, CA, 1980 and 1986.

dramatic drop in occupancy that occurred throughout the State and country (table A-6).

MARKET COMPETITION

Many of KFHP's competitors in northern California are also nonprofit organizations, although in recent years a growing number of

for-profit competing plans have either entered the northern California market or converted from nonprofit status. Table A-7 shows the profit status and other key data for a selection of competing HMOs.

¹ Although KPNCR hospitals are open to all members of the community, they primarily serve KPNCR members.

Table A-6.--Percent of Average Hospital Occupancy, KPNCR, California, and the United States, Selected Years From 1976 to 1986

	1976	1978	1980	1982	1984	1986
KPNCR.....	75.8%	5.8%	77.9%	76.5%	77.3%	68.6% ^a
California ^b	65.6	66.3	68.7	68.5	64.1	65.4
United States ^b	74.6	73.6	75.6	75.3	69.0	N/A

^aThe lower occupancy rate reflects a reduction of elective admissions during a 7 week strike by hospital employees during 1986.

^bIncludes Kaiser Permanente facilities.

SOURCES: American Hospital Association, *Hospital Statistics* (Chicago, IL: AHA, 1971-1985). State of California, Office of Statewide Health Planning and Development, "Quarterly Financial and Utilization Report, 4th Quarter, 1986," Sacramento, CA, April 15, 1987.

Table A-7.--Largest Non-Kaiser Northern California HMOs

	Enrollment 3/87	Profit status	Qualification status	Plan age	Headquarter city
Foundation Health Plan.....	165,456	P	FQ	9	Sacramento
Take Care.....	15,000	NP	FQ	8	Oakland
Lifeguard.....	105,000	NP	FQ	8	San Jose
Bay Pacific.....	84,051	P	FQ	8	San Bruno
HEALS.....	60,000	NP	FQ	5	Emeryville
Maxicare (N. Ca.).....	59,100	P	FQ	13	Burlingame
Health Plan of America.....	46,200	NP	FQ	6	Orange
Health Plan of the Redwoods.....	32,100	NP	FQ	7	Santa Rosa
Institute for Preventive Medicine (IPM).....	24,225	P	FQ	8	Vallejo
Children's Hospital.....	21,000	NP	NFQ	11	San Francisco
French Hospital.....	17,500	NP	FQ	136	San Francisco
Healthcare.....	17,425	NP	FQ	11	Sacramento
Summa Health Plan.....	17,000	P	FQ	2	Fresno
Contra Costa Health Plan.....	10,809	NP	FQ	13	Martinez
ValuCare.....	10,200	P	FQ	1	Fresno

Abbreviations: P = for profit; NP = nonprofit; FQ = federally qualified; NFQ = not federally qualified.

SOURCE: Interstudy, *The InterStudy Edge*, Excelsior, MN, Summer 1987.

Appendix B: THE PRODUCT-LIMIT ESTIMATOR

The product-limit estimator for the distribution of lifetime cost, $S(c)$ is given by:

$$\hat{S}(c) = \prod_{j < c} P_j,$$

- where
- c is a level of lifetime cost attained by a case who died.
 - j is a ranking from 1 to J for the J levels of lifetime cost attained by cases who died.
 - P_j is the proportion of cases surviving to attain higher cost levels among all cases observed to attain the j th cost level.
 - $\prod_{j < c}$ is the product calculated over all j less than c .
 - $\hat{S}(c)$ is the estimated proportion of all cases whose lifetime cost will be more than c .

The product-limit estimate of median lifetime cost is the cost level c for which $\hat{S}(c) = 0.5$; the estimate of mean lifetime cost is the area beneath a plot of $\hat{S}(c)$; namely,

$$\hat{\mu} = \sum_j \hat{S}(c_j) (c_j - c_{j-1})$$

Ninety-five percent confidence limits are presented for this mean lifetime cost, using the variance estimator

$$\text{Var}(\hat{\mu}) = \sum_c (A_c^2 d_c) / [n_c (n_c - d_c)],$$

- where
- d_c is the number of cases who die at cost level c , and
 - n_c is the number of cases who attain a cost of c or more, and

$$A_c = \sum_{j > c} \hat{S}(c) (c_j - c_{j-1})$$

**Appendix C: CENTERS FOR DISEASE CONTROL (CDC)
CALIFORNIA AIDS PROJECTIONS**

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF HEALTH SERVICES

714/744 P STREET
SACRAMENTO, CA 95814

January 12, 1987



To: Readers of the AIDS Monthly Field Activities Report
Subject: Centers for Disease Control (CDC) California AIDS Projections

An addendum has been attached to AIDS Monthly Activities Report. At our request, CDC has run AIDS case projections for California through 1991. These projections are based on the same empirical model used to generate the national projections presented at the Coolfont, Virginia planning conference in June of last year. The model is based on past reporting trends, and does not take into consideration the effects of behavioral modification or potential clinical or pharmaceutical interventions. The California analysis is based on California AIDS cases reported to the CDC as of December 29, 1986.

Please note the difference between the projected cases for 1986 (3250) and actual number of cases reported as of 12/29/86 (2129). Because of an approximate two month reporting lag, there is a sizable difference between these two numbers. It is expected that the final reported total for 1986 will be somewhat higher than the current 2129 cases. At the end of 1985 we reported a total of 1595 cases for the year. One year later, the total cases for the same one year period (1985) has grown to 2135. We expect that when all of the cases for 1986 are tabulated we can expect to see at least as large an increase as last year.

The model suggests a cumulative total of nearly 50,000 cases of AIDS will be diagnosed in California by the end of 1991, with approximately 34,000 deaths. Additionally, the model projects a larger proportion of cases will be reported from outside the San Francisco and Los Angeles standard metropolitan statistical areas (SMSA's). If present trends continue, it is expected that these areas will report 31% of California AIDS cases during 1991.

If you have questions concerning the technical basis of these projections, please contact Michael Hughes at (916)445-0553.

Donald O. Lyman

Donald O. Lyman, M.D., Chief
Office of AIDS

- 1) Public Health Service Plan for the Prevention and Control of AIDS and the AIDS virus: Report of the Coolfont Planning Conference June 4-6, 1986. (Copies available upon request).
2. Statistical Report No.86-1: An Empirical Model for Projecting Trends in AIDS Cases, W. Meade Morgan, Ph.D., AIDS Program, Center for Infectious Diseases, Centers for Disease Control, Atlanta, Georgia 30333.

ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS)
MONTHLY FIELD ACTIVITIES REPORT
 January 1981 - December 31, 1986

Department of Health Services
 Office of AIDS
 P.O. Box 160146
 Sacramento, CA 95816-0146

California Cases by residence at onset of illness from
 January 1981 to December 31, 1986 (includes 13 cases
 reported prior to January 1981)

1. CASES AND DEATHS REPORTED THIS MONTH

PRIMARY DISEASE	CASES	DEATHS
KS without PCP	24	34
PCP without KS	106	85
Both KS and PCP	8	7
OI without KS or PCP	37	24
TOTALS THIS MONTH	175	150

2. RISK GROUP SUMMARY OF CASES REPORTED THIS MONTH

	NUMBER OF CASES			
	MALE	FEMALE	TOTAL CASES	% OF TOTAL
Homosexual	150	0	150	85.71
Bisexual	19	0	19	10.86
Intravenous (IV) Drug User	4	1	5	2.86
Hemophiliac	0	0	0	0.00
Heterosexual Contact	4	2	6	3.43
Transfusion	3	1	4	2.29
Parent at Risk	0	0	0	0.00
None/Apparent/Unknown	-6*	-3*	-9*	-5.14
TOTAL	174	1	175	100.00

*NOTE Negative values indicate a change in risk.

3. <u>PRIMARY DISEASE</u>	CASES	% of TOTAL	DEATHS	% DEAD
KS without PCP	1636	24.08	677	41.38
PCP without KS	3797	55.88	1860	48.99
Both KS and PCP	357	5.25	242	67.79
OI without KS or PCP	1005	14.79	537	53.43
TOTAL TO DATE	6795	100.00	3316	48.80

KS = Kaposi's sarcoma
 PCP = Pneumocystis carinii pneumonia
 OI = Other opportunistic infections

4. <u>AGE</u>	CASES	% OF TOTAL
Under 5	21	0.31
05 - 13	6	0.09
14 - 19	15	0.22
20 - 29	1063	15.64
30 - 39	3148	46.33
40 - 49	1660	24.43
Over 50	858	12.63
Unknown	24	0.35
TOTAL	6795	100.00

5. <u>RACE/ETHNICITY</u>	CASES	% OF TOTAL
White, not Hispanic	5390	79.32
Black, not Hispanic	606	8.92
Hispanic	673	9.90
Haitian	6	0.09
Asian or Pacific Is.	71	1.04
American Indian/Alaskan	7	0.10
Other	1	0.01
Unknown	41	0.60
TOTAL	6795	100.00

6. RISK GROUPS

	NUMBER OF CASES		TOTAL CASES	% OF TOTAL
	MALE	FEMALE		
Homosexual	5507	0	5507	81.04
Bisexual	721	0	721	10.61
Intravenous (IV) Drug User	127	28	155	2.28
Hemophiliac	47	8	55	0.81
Heterosexual Contact	33	25	58	0.85
Transfusion	100	36	136	2.00
Parent at Risk	4	7	11	0.16
None/Apparent/Unknown	135	17	152	2.24
TOTAL	6674	121	6795	100.00

7. FATALITY RATES BY TIME OF DIAGNOSIS

	CASES	DEATHS	RATE
Before 1981	13	10	76.92
1981 Jan-June	19	18	94.74
Jul-Dec	40	33	82.50
1982 Jan-June	78	59	75.64
Jul-Dec	135	102	75.56
1983 Jan-June	284	211	74.30
Jul-Dec	389	294	75.58
1984 Jan-June	537	376	70.02
Jul-Dec	713	478	67.04
1985 Jan-June	989	575	58.14
Jul-Dec	1146	528	46.07
1986 Jan-Jun	1411	459	32.53
Jul-Dec	1041	173	16.67
TOTAL	6795	3316	48.80

AIDS CASES BY COUNTY OF RESIDENCE AT ONSET OF ILLNESS

January 1981 - December 31, 1986

	CASES	DEATHS
San Francisco	2471	1302
Los Angeles	2430	1108
San Diego	358	184
Alameda (ex. Berkeley) ..	283	115
Orange	245	127
Santa Clara	133	53
San Mateo	109	49
Riverside	107	70
Sonoma	95	49
Contra Costa	92	35
Sacramento	72	28
Marin	63	31
San Bernardino	49	20
Santa Barbara	39	14
Monterey	31	16
Ventura	25	11
Fresno	24	13
San Joaquin	18	11
Santa Cruz	18	10
Solano	17	6
Berkeley	14	6
Kern	14	3
Mendocino	13	7
San Luis Obispo	13	8
Napa	11	5
El Dorado	7	5
Lake	5	5
Shasta	4	2
Stanislaus	4	3
Yuba	4	2
Butte	3	2
Imperial	3	3
Merced	3	2
Placer	3	2
Siskiyou	3	2
Yolo	2	0
Glenn	1	1
Humbolt/Del Norte	1	1
Inyo	1	0
King	1	1
Madera	1	1
Plumas	1	1
San Benito	1	0
Sutter	1	1
Trinity	1	1
Tulare	1	0
TOTAL	6795	3316

Table 1
Reported Cases of AIDS and AIDS-Related Deaths among
Residents of California - December 29, 1986

REPORTED:

<u>Year</u>	<u>Cases Diagnosed</u>	<u>Deaths</u>
1981 & before	67	21
1982	202	66
1983	639	253
1984	1219	608
1985	2136	1136
1986	2129	1122

PROJECTED:

	<u>Cases Diagnosed (68% bounds)</u>	<u>Deaths (Range)</u>
1986	3250 (3100, 3400)	1930 (1870, 2000)
1987	4650 (4350, 4950)	2950 (2800, 3100)
1988	6300 (5600, 6900)	4200 (3900, 4500)
1989	8200 (6600, 9300)	5700 (5000, 6300)
1990	10400 (7500, 12100)	7500 (6050, 8500)
1991	12900 (8100, 14600)	9600 (6950, 11150)

Table 2
Percent of California Cases by Area (SMSA) of Residence
December 29, 1986

REPORTED CASES:

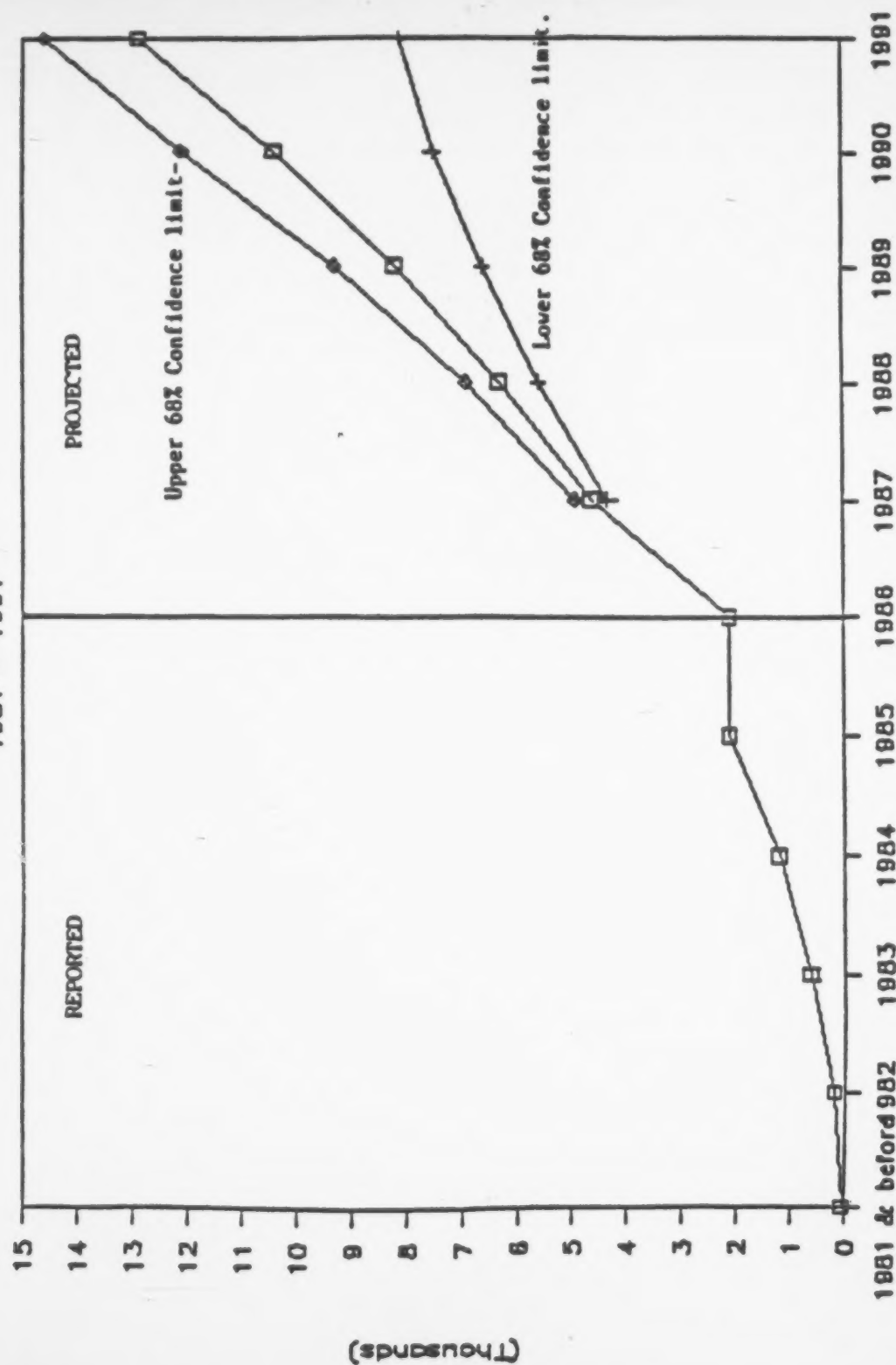
<u>Year</u>	<u>San Francisco</u>	<u>Los Angeles</u>	<u>Other California</u>
1981 & before	52.2	32.8	14.9
1982	53.0	35.6	11.4
1983	48.0	39.3	12.7
1984	48.6	35.7	15.7
1985	42.6	38.2	19.2
1986	45.1	37.2	17.7

PROJECTED CASES:

1986	42.8	37.3	19.9
1991	33.5 (29.4, 37.7)*	35.7 (31.4, 40.1)*	30.8 (26.4, 35.5)*

*68% confidence bounds are given in parentheses.

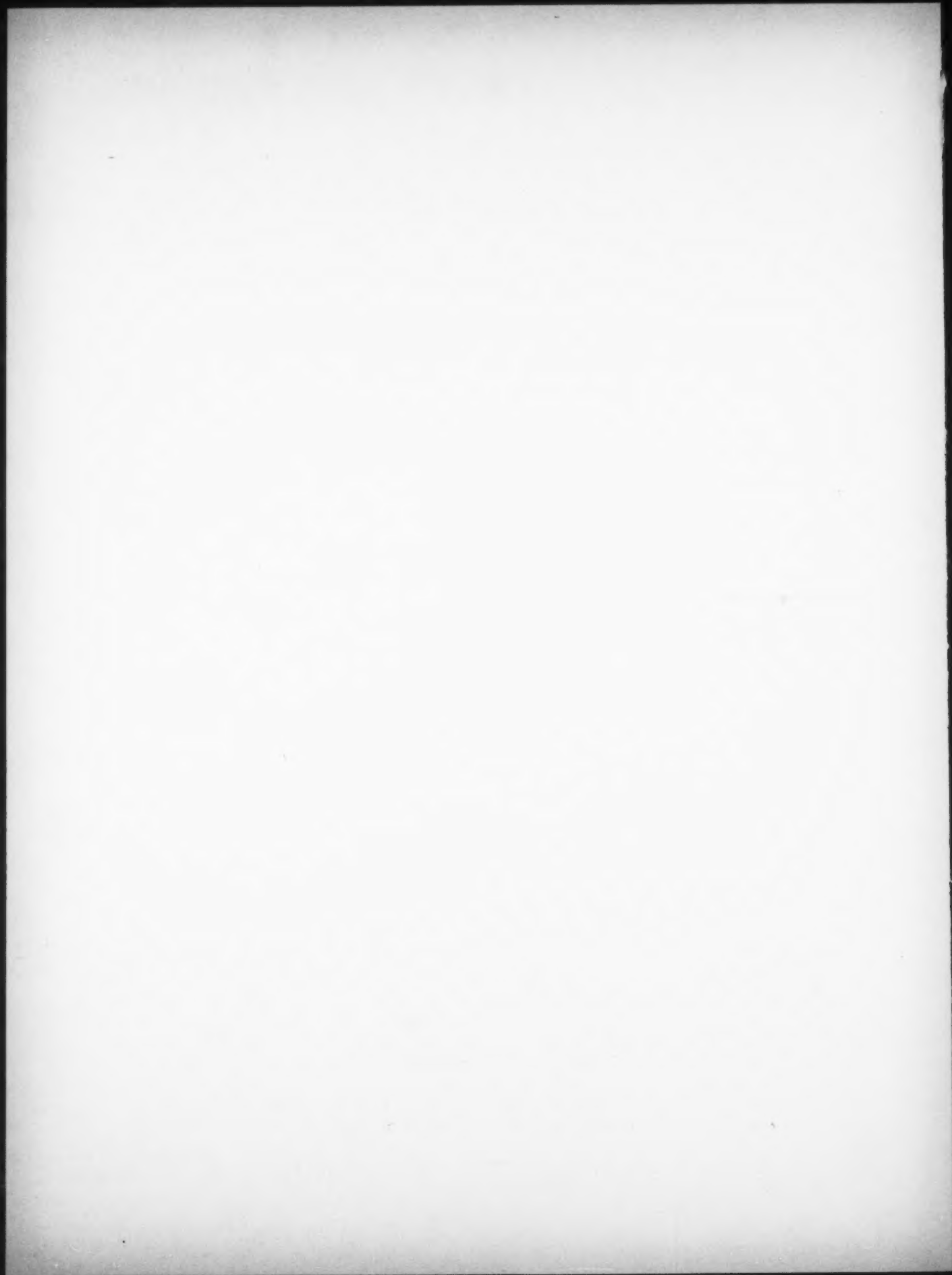
CALIFORNIA Reported & Projected AIDS Cases 1981 - 1991



This graph depicts the reported and projected AIDS cases for the State of California as of 12/29/86
Source: Department of Health Services, Office of AIDS, Sacramento, California 95814.

Appendix D: LIST OF ABBREVIATIONS

AIDS	--acquired immunodeficiency syndrome
ARC	--AIDS-related complex
AZT	--azidothymidine (currently known as zidovudine)
CDC	--Centers for Disease Control
HIV	--human immunodeficiency virus
IUS	--Inpatient Utilization System
KFH	--Kaiser Foundation Hospitals
KFHP	--Kaiser Foundation Health Plan
KPNCR	--Kaiser Permanente Northern California Region
KPMCP	--Kaiser Permanente Medical Care Program
KS	--Kaposi's sarcoma
PCP	-- <i>Pneumocystis carinii</i> pneumonia
TPMG	--The Permanente Medical Group, Inc.



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